

**APPENDIX 7-15**  
**PROBABLE HYDROLOGIC**  
**CONSEQUENCES DETERMINATION**

**R645-301-728      Probable Hydrologic Consequences**

**Determination**

This document has been prepared in accordance with requirements of the State of Utah R645 Coal Mining Rules. The format follows the regulations R645-301-718.100 through R645-301-728.400.

**R645-301-728.100      Determination**

Mine dewatering is the primary mechanism by which the ground water system could be impacted. As stated in Section 7.24.1, "it is believed that the water emitting from seeps and springs in State Leases ML-21568 and ML-21569, as well as in the surrounding areas, originate from perched aquifers with no direct communication with the regional Blackhawk - Star Point aquifer. Monitoring of in-mine and surface wells indicate the potentiometric surface of the regional Blackhawk-Star Point aquifer lies approximately 50 to 60 feet below the top of the Star Point Sandstone. Consequently, mining of the Hiawatha at the base of the Blackhawk Formation, overlying the Star Point Sandstone, presents no threat of intercepting ground water in the regional Blackhawk-Starpoint aquifer. Thus, dewatering resulting from mining the Hiawatha Coal of the Blackhawk Formation has little potential for impact. No water inflow is occurring in the Crandall Canyon Mine, consequently water is being pumped into the mine. The vast majority of this water is used in the mining operation, with the remainder stored in an underground sump for use underground. Discharge for the mine has occurred only 3 times in the last 5 years.

As discussed in Section 7.24.2, the permit area is drained by ephemeral, intermittent, and perennial watersheds. These watersheds are steep (with average slopes often exceeding 50 percent) and well vegetated (with percent covers also often exceeding 50 percent). The primary potential for impact to surface water is in the form of increased sedimentation from the operations. There is also potential for decreased surface flows due to pumping from Crandall Creek.

Impacts to the surface water quality and quantity are minimized through the installation and maintenance of surface runoff and sediment control structures, and a commitment (Section 7.24.2, p. 7-46) to not pump from Crandall Creek at a rate that will cause the in-stream flow to decrease below the minimum required rate.

In addition, ground water and surface water quantity and quality are monitored on a year-round basis to determine seasonal flow conditions for the entire permit and adjacent areas, as described under Section 7.31.2 of the plan. Further, handling plans have been implemented for earth, refuse and acid-toxic

forming materials, which will prevent or control discharge of pollutants to the hydrologic system (Section 7.31.1). This will be accomplished using the best technology currently available.

Based on the above, there is some potential for the operation to have an impact on the ground water and surface water resources of the area; however, the impacts are expected to be minimal due to natural geologic and hydrologic conditions, and the implementation of control and protection systems as described above and further detailed in Chapter 7 of this permit. Therefore, the "Probable Hydrologic Consequences" of this operation are expected to be minimal, if not negligible.

#### R645-301-728.200      Basis for Determination

The PHC Determination for this operation is based on baseline hydrologic, geologic, and other information gathered specifically for this site and the surrounding area by the permittee. Additional, regional information has been provided through various published reports as noted in the plan.

Specific ground water information is provided in Section 7.24.1 of Chapter 7. Surface water data is presented in Section 7.24.2. Geologic and climatological information is provided in Sections 7.24.3 and 7.24.4, respectively.

#### R645-301-728.300      Findings

7.28.310 Chapter 7, Sections 7.24.1 and 7.24.2, indicate the potential for adverse impacts to the hydrologic balance to be minimal. The basis for such determinations is through extensive studies, monitoring, past history, and performance of the on-going operation, and various protection plans for operations and reclamation. The above information is detailed in Chapter 7 of the permit and is not repeated here.

7.28.320 As discussed in Section 5.28.30, waste rock is not produced during mining operations. When incidental quantities of rock are encountered, the rock is left in the mine and will not be removed at any time in the future; thus, no negative effects are expected from the acid-forming potential of strata which overlie and underlie the Hiawatha seam. However, to further characterize the acid-forming potential of strata immediately above and below the Hiawatha seam, the applicant will collect additional roof- and floor-rock samples from three equally spaced locations within the current mine workings (including the State Lease and Right-of-Way areas). Analytical results from these three sets of samples will be used to evaluate the need for additional sampling to adequately characterize the acid-forming potential of the strata.

7.28.330 The following are expected impacts from the coal mining and reclamation operation:

7.28.331 Sediment yield will naturally increase from areas disturbed for the operation. A runoff curve number of 69 has been determined for the undisturbed areas, 75 for reclaimed areas within the disturbed area, and a number of 90 is used for runoff from disturbed areas (roads and pads). The majority of the disturbed area runoff is directed to the sediment pond and is described in Chapter 7, Section 7.42.22. Required sediment storage for the pond has been determined to be 0.30 acre feet, including 0.27 acre feet from disturbed areas and 0.3 acre feet from undisturbed and reclaimed areas over a 3 year period. Storm runoff was determined to be 0.68 acre feet. The pond is designed with a total storage volume of 0.98 acre feet, which allows for complete containment of sediment.

There are 7 small areas which do not drain to the sediment pond, as shown on Plates 7-5 and Figure 7-18a, and described in Chapter 7, Section 7.42.21. Sediment yield from these areas is minimized through the use of sediment traps, straw bale dikes, silt fences, and vegetation as described in Section 7.42.21.

Sediment yield is therefore minimized from the disturbed areas through the installation and maintenance of the above described controls.

7.28.332 Water quality parameters, including acidity, total suspended solids and total dissolved solids, are not expected to be impacted by the mining or reclamation operations. This determination is based on information provided in Chapter 7, Sections 7.24.1 and 7.24.2, and by results of the on-going water monitoring program detailed in Section 7.31.2.

It is unlikely that ground water quality or quantity will be affected by the underground mining operation (Section 7.24.1). There is some potential for impacts to the surface water; however, once again, these are expected to be minimal for the following reasons:

- (1) Sediment controls are in place and maintained to minimize sediment loading to drainages;
- (2) All discharges from the sediment pond (or mine) are in accordance with requirements of a U.P.D.E.S. Permit;
- (3) Historical data from this site (which is summarized in the Annual Report) shows no indication of mine related impacts on the hydrology of the area;
- (4) The water monitoring program will continue to be followed as described in Chapter 7, Section

7.31.2. Results will continue to be analyzed (and any problem areas noted will be corrected to prevent further impacts to the hydrology.

728.333 The potential for flooding is minimized by the design and installation of adequately sized diversions, sediment pond and velocity control structures as described in Chapter 7, Section 7.40. All diversions are sized for a 25 year - 24 hour storm event. Ditches, culverts and sediment pond are designed for a 10 year - 24 hour storm event. Ditches, culverts and sediment pond are designed for a 10 year 24 hour storm event.

Although there is no stream alteration, there is some potential for the Crandall Creek to impinge upon the sediment pond embankment due to their close proximity. The toe of the sediment pond has therefore been fortified with an additional 2 feet of 12.5 inch D50 rip-rap for protection. An analysis of the Crandall Creek flow and pond protection indicates it is adequate for a return period in excess of 10,000 years (Section 7.42.22, p.7-100). A slope stability analysis has also been performed on the pond indicating it meets required safety factors (Chapter 7, Table 7-7).

728.334 As discussed in Chapter 7, Section 7.24.1, the mining operation is expected to have little impact on ground water. As mentioned in Section R645-301-728.100, the mine is producing no water. Water is having to be pumped into the mine for use in mining operations. The mine has only discharged water 3 times in the last 5 years.

Monitoring of in-mine and surface monitoring wells drilled within and adjacent to the Crandall Canyon Mine, and completed in the regional Blackhawk-Starpoint aquifer indicate the potentiometric surface of this aquifer lies 50 to 60 feet below the top of the Starpoint Formation. Mining of the Hiawatha Coal Seam at the base of the Blackhawk Formation, overlying the Star Point Formation, will not intersect and drain any water from the regional aquifer. Field reconnaissance conducted by Genwal officials and their representatives reveal the water of the Little Bear Spring in T16S-R7E-Sec9 is emitting from the Spring Canyon Member of the Star Point Formation. Meetings with the Castle Valley Special Service District officials and their representatives, as well as the other water user districts of the area, on 10 June 1993 revealed that they also believe the Little Bear Spring emits from the Spring Canyon Member of the Star Point Formation. The concern of the Castle Valley Special Service District regarding diminution and mitigation of the Little Bear Spring flow that could result from future mining were discussed. Given the elevations of the Starpoint aquifer potentiometric surface, and that of the Hiawatha Coal Seam, it was shown that the present mine workings would not interfere with the Starpoint aquifer. A tour of the current mine workings of the Crandall Canyon Mine was given by Genwal Coal, where it was shown that no mine inflow is occurring. In short,

without intercepting any water, not to mention flow in the Spring Canyon Member of the Star Point Formation - the source of water of the Little Bear Spring - there is little if no chance that current mine workings of the Crandall Canyon Mine could affect the Little Bear Spring.

Surface water availability could be impacted by excessive pumping of water from Crandall Creek for the operation. This is not expected to occur since Genwal has committed to not pump from Crandall Creek at a rate that will cause the in-stream flow to decrease below the minimum required rate (Chapter 7, Section 7.24.2, p. 7-46).

There is also some potential for impact to springs and seeps through subsidence. Springs and seeps have been identified through intensive surveys (Tables 7-1 and 7-2). Water rights have also been researched and are provided in Chapter 7, Tables 7-3 and 7-6. Genwal is currently monitoring the water flow rates and quality of the water rights within and adjacent to the current mine permit area.

An alternative water source plan has been developed in the event any water rights or springs/seeps are adversely affected by the mining operation or reclamation activities. This plan is detailed in Chapter 7, Section 7.27.

7.28.335 Additional information will be provided if deemed necessary by the Division.

R645-301-728.340 N/A

This is an underground operation.

R645-301-728-400 Updated PHC

This document is provided as an up-dated PHC for the permit renewal in accordance with the State of Utah R645-Coal Mining Rules.